Problem of the Day: An Innovative Problem Solving Series for Fourth Grade Teachers

An Honors Thesis (HONRS 499)

by

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May 2012

Expected Date of Graduation

May 2012

Abstract

Problem solving is an important aspect of education, and it has the ability to present students with intellectual challenges to strengthen their mathematical development. Numerous problem solving series exist today, offering students the opportunity to build mathematical reasoning and think abstractly, but few do so in a way that is fun and engaging for students. This problem solving series follows two mystical characters on 60 adventures around the world as they ask for students to help answer a range of questions they stumble upon along the way. Included in this series are not only captivating word problems for students in a layout that promotes well-rounded learning, but also a guide for teachers, linking the problems to national standards and offering suggestions and strategies to make the series a success in their classrooms. I offer a new way to encourage students to find motivation in solving problems and apply mathematics to real-world applications.

Acknowledgements

I would like to thank Becky Gentry for her guidance throughout the creation of this project. Her support was greatly appreciated when I decided on a change in direction, and her advising helped me create a well-rounded project.

I would also like to thank Tammy Marshall and her fourth grade class for testing out the problems and giving their feedback, Leander Kauffman for her editing assistance, and Kenneth Winner for helping with the development of the characters in the series.

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Author's Statement

One of the first things I noticed, when I began student teaching in a fourth grade classroom at an American Army base in Germany, was the video game obsession that resided in a great number of the male students. I would constantly hear boys talking about the villains they had defeated or the challenges they had conquered, and I couldn't help but wonder if I could channel this appeal to classroom learning. I was determined to use the basic elements of video games to make learning engaging. Between a stray thought about including more problem solving in the classroom from my supervising teacher and a brief introduction on why video games are so appealing from a seasoned gamer, the spark for an innovative problem solving series was ignited. What began as a personal resource for me to use in my classroom, my *Problem of the Day* series quickly transformed into a resource to be shared and used by fellow fourth grade teachers in need of a way to make problem solving an engaging part of daily classroom learning.

While student teaching, the first subject I became responsible for was math. My supervising teacher gave me a very loose structure to follow, allowing me to incorporate my own personal style into my teaching. She gave me the topics she wanted me to cover, the Pearson enVision math series resources provided by the school, and the idea that it might be beneficial to include more opportunities for the students to practice the problem solving process. Each individual math topic in the enVision math series has a corresponding set of materials, including a problem of the day, but I found these questions to be basic and unmotivating, and I did not foresee the students being overly eager to solve

them. Rather than beginning the math lesson with groans, I chose to aim for enthusiasm, which encouraged me to create my own problem solving series.

Before reaching the decision to create my own series, I had a discussion with a close friend about the appeal of video games. He has played video games for as long as he can remember, although I never understood why these games brought him so much enjoyment. I wanted to know what makes video games so enthralling for those who play them, so that I could incorporate this into learning, and my friend was more than happy to help. He claimed the ongoing storyline and the ability to live vicariously through your character were the biggest aspects that drew him in. With video games, he explained, you become a part of the universe you are playing in, and you can pick up where you left off at any time. Your character has super-human abilities, and you are capable of doing things you could never dream of doing in real life, such as flying, transporting to magical places, or defeating creatures so wild, they could only come from your imagination. As I began thinking about his insight, I felt that the creation of my own problem solving series would be a fantastic outlet to implement these aspects. I decided to create my own *Problem of the Day* resource that would follow a continuous storyline and have recurring characters with magical abilities, and I began brainstorming my characters.

I chose a wizard as my main character for multiple reasons. My main logic behind this was because wizards have countless super-human abilities. I knew that wizards were a popular character in numerous video games, and I thought that students who played video games might acknowledge a wizard as a legitimate mystical character. The mascot for the school I was teaching at was also a wizard, and I felt this would make the character more

familiar for the rest of the students. I chose an owl for the wizard's trusty sidekick, due to the owl's representation in our culture of being a wise creature. I felt that wisdom would be an appropriate talent for solving problems, and his name, Calcul, was derived from the word *calculator*. The wizard, Macros, was named after a great sorcerer, Macros the Black, from Raymond E. Feist's 1982 novel, *Magician*. Their journey begins in their hometown of Zauberland (German for *land of magic*), although they rarely find themselves here, due to their love of traveling and their determination to see the world. One of the advantages of being stationed in Germany, was that a large portion of the students had the opportunity to travel throughout Europe, allowing the students to be able to relate to Macros and Calcul's travels. They were able to make a personal connection if the characters traveled to a place they had also traveled to or been to before. The rate at which Macros and Calcul traveled, their means of transportation, and some of their experiences were still very mystical and continued to hold the power of letting the students vicariously see the world through them.

Not only is the purpose of this series to engage students, but also to enhance the mathematical development of students. Problem solving has the ability to present students with intellectual challenges that require them to think at a higher level and reason mathematically. I wanted my students to be able to have the opportunity to practice the concepts they were currently learning in math, but take this to the next level and extend what they know through the incorporation of mathematical reasoning. Rather than simply asking my students, "What is 567+391?"I chose, instead, to ask the same question in a way that would require the students to find the problem on their own. I included extraneous information for them to sort through and a challenge for them to solve. Worthwhile tasks should be both engaging and require hard work, and that was my aim with this series (Cai

& Lester, 2010). Problem solving has the ability to promote conceptual understanding and build mathematical communication and reasoning, but in order for it to be effective, it must capture students' interests and engage curiosity (Cai & Lester, 2010).

When creating this series, I looked to the National Council of Teachers of Mathematics (NCTM) and the Common Core State Standards for Mathematics (CCSS) as guides. Both are highly regarded as resources for national math standards, and I felt it would be more appropriate to look at a national, rather than state, level, in order to appeal to a wider audience. According to NCTM, effective problems must require higher-level thinking, be able to be approached by students in multiple ways, and create an opportunity for teacher assessment (Cai & Lester, 2010). I used this criteria for worthwhile problems, along with the practices encouraged by CCSS, including being able to reason abstractly and construct viable arguments, as a foundation for the problems I created (NGA Center, 2010, p. 28). I chose to include a wide range of skills, as well as skill levels, to make the series more diverse. Some questions simply require the students to add or subtract two multi-digit numbers, while other problems require the students to solely use reasoning to solve them. I wanted to ensure that simply solving a math equation wasn't the only focus. I felt it was just as important for students to determine what the question is that they are being asked and how they should go about solving it, because these are the crucial pieces that help build higher level thinking and problem solving skills.

How students communicate their process of solving a problem is also a vital part of problem solving and I chose to require students to represent their work in multiple ways.

Students can show their work through many ways, including writing, drawing pictures, or creating tables, and I decided to give a certain degree of choice in this regard (Goodnow & Hoogeboom, 2008). I feel that it is important for students to be able to communicate their thought process using words, as well as through visual means, which formed the layout of the student worksheets in this series. Every page has a work space, where the students have the opportunity to create a visual representation of how they solved the problem. A final answer box is also provided for students to clearly mark their answer. The students must then write to explain how they solved the problem. Many students feel a disconnect between math and writing, which makes this step even more crucial. It is important for students to have the ability to communicate in a variety of ways, which is why I chose to require students to represent their answers in two different ways. Each worksheet closes with a space for students to record the strategies they used to solve the problem. This encourages students to actively think about the strategies that are available, as well as the ones they chose to use. Being aware of different strategies and how they can be applied can help broaden mathematical development.

There are many benefits to integrating different subject areas when teaching, including a more thorough cover of curriculum and context that is more meaningful for students (Benson, 2004). I chose to incorporate multiple subjects, including science and social studies, into my problem solving series both for further knowledge and engagement. Traveling the world with Macros and Calcul is fun, but it also offers an opportunity to learn about different landmarks, cultures, and interesting facts from around the world. Social studies and science often get lost in the shuffle, with so much emphasis on math and reading, and I felt this would be a great area to incorporate these subjects, even if only

minimally. These problems lead into an opportunity for discussions about the topics covered to spark, and they can act as motivators for students to become encouraged to learn or inquire more.

I had the fortune to be able to implement the majority of this series with the fourth grade students I was teaching, which was a great learning experience. At first, the students were not overly thrilled about the problems, because many of them did not want to put in the required effort. We worked through the problems, step by step, together as a class, and I required all students to start with the basics and underline the question being asked and highlight any important information. Within the first few weeks, the students were beginning to become much more engaged with the series. We began every math lesson with a problem, and the students were excited to find where Macros and Calcul were headed next. We did not complete problems on half days or certain days with scheduled school-wide events, and I would occasionally have students express their disappointment that there was no Macros and Calcul that day. Although not every student responded so positively to the series, there was an undeniable improvement in the students' problem solving over the course of the three months of the implementation of the *Problem of the Day* series. By the end, the students were highlighting the question being asked without prompting, and students were eager to share the strategies they used to solve the problem with the class. The increase in confidence was amazing, and the student responses showed great intellectual development from beginning to end. I feel that this series was extremely beneficial for my students, and has the capability to benefit other intermediate students as well. Not only were the students learning, but they were engaged while doing so, both of which contributed to a deeper understanding of the problem solving process.

A Teacher's Guide to *Problem of the Day: An Innovative Problem Solving Series for Fourth Grade Teachers*

About the series:

This series was born out of a need for an engaging way to incorporate problem solving into the classroom daily. The students needed more exposure to problem solving strategies and opportunities to practice them, and the problem of the day from the textbook was typically unmotivating and overly basic. This series follows a story line and has recurring characters to draw students in and make the series flow. The problems typically include two paragraphs, which are designed to give background information or incorporate other subject areas, and to identify the question and information needed to solve the problem. The layout of the page allows all information and work to be completed on one piece of paper, with a set work space, final answer box, and explanation section designated. The explanation section concludes with a prompt to list any strategies used to solve the problem, which encourages students to actively think about the problem solving strategies they are applying.

Does this series support Common Core State Standards?

Yes! The Grade 4 Common Core State Standards for Mathematics were a guiding force in the creation of this series. The Common Core State Standards emphasize a set of mathematical practices, all of which can be linked to the problem solving used in this series. These practices encourage students to:

- "make sense of problems and persevere in solving them;
- reason abstractly and quantitatively;
- construct viable arguments and critique the reasoning of others;
- model with mathematics;
- use appropriate tools strategically;
- attend to precision;
- look for and make use of structure;
- look for and express regularity in repeated reasoning" (NGA Center, 2010, p. 28).

The problems in this series include all five content areas under the Common Core State Standards: Operations and Algebraic Thinking, Number and Operations in Base Ten, Numbers and Operations—Fractions, Measurement and Data, and Geometry.

How is this series organized?

This series is centered around 60 word problems designed for fourth grade students. Teacher resources are also included, along with the student worksheets, to ensure the students have the proper skills needed to successfully solve these problems. This teacher guide begins with a list of suggested strategies to introduce to the class before starting the daily problems.

Two standards grids related to the Grade 4 Common Core State Standards for Mathematics are included as a resource. The first grid looks at each individual objective under the five standards, and displays which problems are linked to these objectives. The second grid shows the set of standards related to each individual problem. A similar layout is also used to display the problem solving strategies that are most appropriate for each problem. Many problems can be solved in different ways and students are not limited to the specific strategies that are suggested. The teacher guide is followed by the student worksheets and one answer key for the series.

How should I introduce the series?

You may want to discuss the problem solving process with students before beginning the series and work through the first set of problems as a class, with extensive teacher modeling. You can explain to students that the first step in problem solving is to identify the problem or question they are being asked. Students may want to underline, highlight, or circle the question in order to begin the problem solving process, and the teacher can also model this. The students then need to identify the important information needed to solve the problem. The problems in this series are full of background and extraneous information, which can distract students from finding the correct answer. The teacher can also model clearly marking this information.

The students then need to choose a strategy to use, solve the problem, and check their answer. Suggested strategies are listed on the following page, and there are often multiple strategies that can be used to solve a problem. It might be beneficial to allow students to share their work with the class, to let their peers have the opportunity to look at the problem from a perspective they might not have seen. The students should use the work space to solve their answer, and write their final answer in the space provided. It is always useful to teach students to look back and check their work, in order to ensure they provided a reasonable answer.

What strategies should I incorporate?

There are often many different ways to solve a problem, and the students should be exposed to a variety of ways of solving problems. Below are some suggested strategies to teach in your classroom.

- Make a Table or Graph
- Try, Check, Revise
- Write an Equation
- Work Backwards
- Use Reasoning
- Break it Down
- Draw a Picture

Common Core State Standards

Standard	Problems Incorporating Standard
Operations and Algebraic Thinking	
Use the four operations with whole numbers to solve problems.	
4.OA.1: Interpret a multiplication equation as a comparison.	4, 5, 9, 28, 30, 34, 39, 40, 44, 47
4.OA.2: Multiply or divide to solve word problems involving multiplicative comparison.	4, 5, 9, 28, 30, 34, 39, 40, 44, 47, 48
4.OA.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations.	7, 8, 10, 11, 13, 19, 21, 22, 23, 24, 25, 26, 27, 31, 33, 41, 43, 46, 47, 49, 50, 53, 57, 58, 59
Gain familiarity with factors and multiples.	
4.OA.4: Find all factor pairs for a whole number in the range 1–100. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number.	
Generate and analyze patterns.	
4.OA.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.	
Number and Operations in Base Ten	
Generalize place value understanding for multi-digit whole numbers.	
4.NBT.1: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	33, 44
4.NBT.2: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place.	19

4.NBT.3: Use place value understanding to round multi-digit whole numbers to any place.	28
Use place value understanding and properties of operations to perform multi-digit arithmetic.	
4.NBT.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm.	8, 10, 24, 25, 27, 29, 38, 41, 43, 46, 51, 57, 58
4.NBT.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations.	9, 40, 44, 47
4.NBT.6: Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division.	30, 33, 48
Numbers and Operations—Fractions	
Extend understanding of fraction equivalence and ordering.	
4.NF.1: Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size.	1
4.NF.2: Compare two fractions with different numerators and different denominators.	1
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.	
4.NF.3: Understand a fraction a/b with a > 1 as a sum of fractions 1/b.	2, 3
4.NF.4: Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.	

Understand decimal notation for fractions, and compare decimal fractions.	
4.NF.5: Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.	
4.NF.6: Use decimal notation for fractions with denominators 10 or 100.	
4.NF.7: Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole.	
Measurement and Data	
Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.	
4.MD.1: Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit.	11, 32, 33, 34, 36, 37, 39, 42, 44, 47, 48
4.MD.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.	4, 5, 6, 7, 11, 12, 13, 21, 24, 26, 29, 46, 47, 48, 49, 50, 51, 53, 58, 59
4.MD.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems.	8, 9, 10, 27, 38
Represent and interpret data.	
4.MD.4: Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.	

Geometric measurement: understand concepts of angle and measure angles.	
4.MD.5: Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.	
4.MD.6: Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.	
4.MD.7: Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts.	
Geometry	
Draw and identify lines and angles, and classify shapes by properties of their lines and angles.	
4.G.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.	17, 18, 45
4.G.2: Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.	14, 16
4.G.3: Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.	52, 54

Math Content Strands

Problems	Operations and Algebraic Thinking	Numbers and Operations in Base Ten	Numbers and Operations—Fractions	Measurement and Data	Geometry
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Math Content Strands

Problems

	Operations and Algebraic Thinking	Numbers and Operations in Base Ten	Numbers and Operations—Fractions	Measurement and Data	Geometry
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					

Math Content Strands

Problems	Operations and Algebraic Thinking	Numbers and Operations in Base Ten	Numbers and Operations—Fractions	Measurement and Data	Geometry
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					

Problem Solving Strategies

Problems

	Make a Table or Graph	Try, Check, Revise	Write an Equation	Work Backwards	Use Reasoning	Break it Down	Draw a Picture
1			■		■	■	
2					■		■
3					■		■
4	■		■			■	
5	■		■				■
6		■	■	■	■	■	■
7		■	■			■	
8			■				■
9			■				■
10			■		■	■	■
11			■		■		
12	■			■	■	■	
13	■					■	
14					■		■
15					■		■
16					■		■
17							■
18							■
19			■				
20					■		

Problem Solving Strategies

Problems	Make a Table or Graph	Try, Check, Revise	Write an Equation	Work Backwards	Use Reasoning	Break it Down	Draw a Picture
21	■	■	■				
22	■				■	■	
23			■		■	■	
24			■	■			
25			■		■		■
26	■				■		
27			■				■
28			■		■	■	■
29			■				
30	■		■		■	■	■
31	■		■		■	■	■
32					■		■
33			■		■	■	
34			■		■		
35		■		■	■		
36					■		
37					■		
38			■				■
39			■			■	
40			■				■

Problem Solving Strategies

Problems	Make a Table or Graph	Try, Check, Revise	Write an Equation	Work Backwards	Use Reasoning	Break it Down	Draw a Picture
41			■				
42	■				■		
43	■		■			■	
44			■				
45					■		■
46	■				■	■	
47			■			■	
48	■		■		■	■	
49	■				■		
50	■					■	
51			■	■			
52					■		■
53					■	■	
54					■		■
55		■			■		
56			■				■
57			■				
58			■				
59					■		
60					■		

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul
Adventure #1

Meet Macros and Calcul! Macros is a fearless wizard from a town called Zauberland, but he has a desire to leave his town and travel around the world. Macros has a magic staff that he can use to travel or conjure up miscellaneous items. His trusty owl sidekick, Calcul, is ready to accompany him on his journey.

Before Macros and Calcul leave for their adventure, they must sort out a small disagreement. Calcul insists that 4/8 of his feathers are dark gray, while Macros argues that 1/3 of his feathers are dark gray. Macros uses his magic staff to count Calcul's feathers. He found that 100 feathers are light gray, while 100 feathers are dark gray. Who is correct?

Work Space:

Final Answer:

Explain how you solved this problem:

_____

_____

_____

_____

_____

Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Punxsutawney Phil
Adventure #2

Macros and Calcul begin their journey by traveling to Punxsutawney, Pennsylvania. They arrive just in time for the biggest Groundhog Day celebration in North America! They celebrate with food and music while waiting for Phil the groundhog to emerge. The sun rises, shining brightly, and Phil catches sight of his shadow as he comes out of his burrow. Will Phil's prediction of a long winter come true?

Calcul was ready for the bitter winter to be over, so he was unhappy with Phil's prediction. He flew into Phil's burrow, where he encountered Phil's family, which included Phil, his 3 brothers, and his 2 sisters. Phil's family was not happy about the intrusion, and 4 of the groundhogs chased Calcul away. What fraction of the groundhogs did NOT bother Calcul?

Work Space:

Final Answer:

Explain how you solved this problem:

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_____

_____

_____

Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul's Lava-ly Day
Adventure #3

Macros and Calcul were unsatisfied with the groundhog's prediction that winter would last for another 6 weeks, so they decided to travel to a warmer destination. They grabbed their beach gear and set off on an exciting adventure to Hawaii.

After some relaxation on the beach, Macros and Calcul head to Mauna Loa, one of the world's most active volcanoes. They learn that the name Mauna Loa means "Long Mountain" and it has an above sea level elevation of over 13,000 feet! There are 13 main volcanoes located in Hawaii with Mauna Loa, Kilaeua, and Loihi being the only volcanoes that are still considered active. What fraction of the volcanoes are extinct?

Work Space:

Final Answer:

Explain how you solved this problem:

_____

_____

_____

_____

_____

Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul's Booming Business
Adventure #4

Macros and Calcul found that their adventures around the world were becoming quite costly. Although Macros could not use his magic staff to produce money, he could use his magic staff to conjure up items that he could sell to make money. He headed to Memphis, Tennessee to start up his business.

He whipped up 54 boxes of chocolates, 22 bags of gummi-bears, and 36 boxes of Girl Scout cookies. The folks in Memphis knew a good deal when they saw one, and when they discovered that Macros was selling the boxes of Girl Scout Cookies for $1 each, they bought them all up! The gummi-bears and chocolates were not as much of a hit, but Macros was able to sell 10 bags of gummi-bears and 6 boxes of chocolates for $2 each. How much money did Macros make from his goodies?

Work Space:

Final Answer:

Explain how you solved this problem:

_____

_____

_____

_____

_____

Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul on the Mighty Mississippi
Adventure #5

Macros and Calcul took a ride down the Mississippi River on the Island Queen riverboat. They listened to fascinating tales of river life, as written by Mark Twain, and heard gruesome stories about the explosion of the SS Sultana, one of the most horrible ship accidents in the history of the United States. They learned all kinds of interesting information about the Mighty Mississippi River and the history that took place there.

Calcul felt that Macros was not giving him a fair share of the profits from his Girl Scout cookie sale, so he decided to take matters into his own wings. He smuggled a few boxes of chocolates onto the Island Queen and increased the price from $2.00 a box to $2.20 a box. Calcul sold three boxes of chocolates to the other tourists on the riverboat while on the sightseeing cruise. How much money did he make? Write your final answer in dollars and dimes.

Work Space:

Final Answer:

Explain how you solved this problem:

_____

_____

_____

_____

_____

Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul vs. Mother Nature
Adventure #6

Macros and Calcul decided they weren't quite ready to give up their time at the beach yet, so they headed to Destin, Florida for another beach experience. Unfortunately, they found themselves caught in an off-season hurricane. Although hurricane season typically doesn't begin until June, Macros and Calcul were unlucky enough to witness a brutal storm. They hid in the storm cellar of their cozy beach house, and listened while the strong winds swirled in a circular path outside and the heavy rain beat against the tin roof of the house.

In order to distract themselves from the fierce hurricane outside, as well as to keep their brains in tip-top shape, Macros and Calcul played math games. They played a few rounds of Pig, as well some logic puzzles. Macros decided to put Calcul's brain to the test with some money math. Macros told Calcul that he had 87 cents in his pocket. He pulled out 3 quarters. Then he asked Calcul what combination of coins could be left in his pocket. What should Calcul answer?

Work Space:

Final Answer:

Explain how you solved this problem:

_____

_____

_____

_____

_____

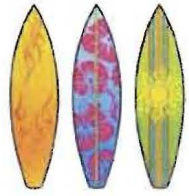
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Hit the Waves
Adventure #7

Macros and Calcul emerged from their storm cellar to observe the damage the hurricane had done. They were excited to find that only minimal damage had been done, and their beach house had barely been harmed. They headed towards the beach to find that one of the results of the hurricane was enormous waves that were perfect for surfing. Macros and Calcul decided to hit the waves, but first they had to go to the surf shop to buy their gear.

Macros had $60 left from his Girl Scout cookie sale in Memphis. He must buy a surfboard, and he would like a surf shirt and a small body board for Calcul, although he can only buy them if he has enough money. Is it possible for Macros to buy all three items?



Item	Price
Flames surfboard	$28
Moon and stars surfboard	$33
Green surf shirt	$10
Gray surf shirt	$8
Waves small body board	$17
Light up small body board	$25

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

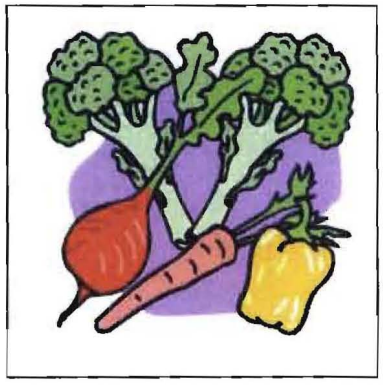
Date: _____ Name of Apprentice: _____

Problem of the Day:
Calcul's Green Thumb
Adventure #8

After a long day of riding the waves and hanging out in the sun, Macros and Calcul are famished. They grill some hamburgers and chow down on their tasty treats. Calcul uses his exquisite baking skills to whip up some red velvet brownies, just in time for Valentine's Day, which is right around the corner. They hang out, living the American dream, which gives them a nice break from all the traveling and tropical storms.

Although Calcul enjoyed his hamburger and brownies, he can't shake his craving for fresh carrots. He decided to recruit Macros to help him create a vegetable garden, which would allow him to have fresh vegetables at any time. Macros whips him up a garden, using his magic staff, but forgot to include a fence to keep the animals out. How much fencing does Calcul need to go buy to go around his entire garden?

10 ft

9 ft  9 ft

10 ft

Work Space:

Final Answer:

Explain how you solved this problem:

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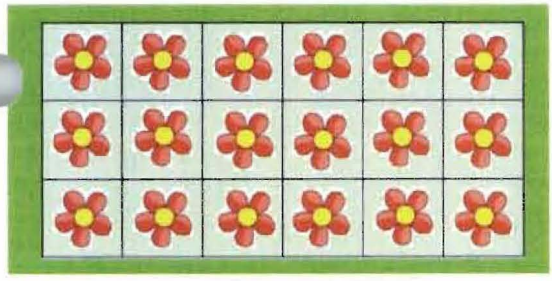
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul in the City of Love
Adventure #9

Macros and Calcul couldn't resist spending the most romantic day of the year in the most romantic city in the world. They packed a small backpack of belongings and traveled to Paris, France with one swift movement of Macros' magic staff. They stared in amazement at the massive Eiffel Tower, and gazed at the masterpieces in the Louvre. Macros and Calcul are happy to be spending Valentine's Day as best friends, as well as in such a city of wonder.

As Calcul is soaring through the air in Paris, he spots a small patch of flowers in a field on the edge of the city. He flies lower for a closer look and is amazed to find beautiful flowers blooming in the middle of winter. He flies back to Macros to share his excitement. Calcul includes all kinds of vibrant details when describing the flower patch. He does not remember, however, how big the area was. Help Calcul figure out how much of the field was covered in blooming flowers.



Work Space:

Final Answer:

Explain how you solved this problem:

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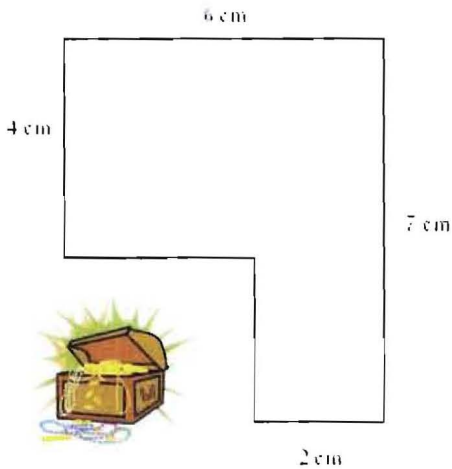
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Explore Notre Dame
Adventure #10

Macros and Calcul decide they might as well spend another day in Paris, since they are already there, and they head to Notre Dame Cathedral. They admire the colorful stained glass windows, and the intimidating gargoyles. They are in awe of the intricate architecture and the sheer size of the cathedral. They have never experienced anything quite like it before!

After wandering the perimeter of the cathedral, Macros and Calcul explore inside. They stroll through, examining the high ceilings and tall arches, and stumble upon a small secret passageway. They sneak through the passage and find themselves in a small room. They are amazed to find a collection of jewels and golden treasures, shining and sparkling before them. Help Macros and Calcul find the area of the hidden treasure room.



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Two New Cowboys in Town
Adventure #11

Macros and Calcul are tired of having to act so sophisticated in France, so they head to Nashville, Tennessee for some southern comfort. They head to the country music capital, trade it their berets for cowboy hats and their shoes for cowboy boots. They are ready for a true country music experience!

At 2:00 p.m. Macros and Calcul head to the Country Music Hall of Fame Museum to learn about the history of country music. They examine old banjos and listen to the progression of country music. They learn about all the stars of the past, as well as some current musicians. It is 4:00 p.m. when Macros and Calcul are ready to leave the museum. How long were they at the museum? Write your final answer in both hours and minutes.

Work Space :

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Fight Crime
Adventure #12

Macros and Calcul shuffled off the ferry from Nashville. The half-hour ride had brought them to the Logwood Island Theater for the biggest event of the year — Country music star Gail Krystelle was giving a free concert! Little did everyone know that backstage a mystery was unfolding. When Macros and Calcul arrived at the scene of the crime, Miss Krystelle began sobbing to them.

"My precious ruby earrings have vanished! I left them in the dressing room at 3:00 this afternoon. But when I returned at 4:00 p.m., they were gone! I just can't go on without them!"

"We'll get to the bottom of this," promised Macros and Calcul. "We have three suspects to investigate."

The three suspects were led into the room. Macros narrowed his eyes and said: "No one was on the island until this afternoon, so you must have come over by ferry today. Now, what were each of you doing in Nashville this afternoon?"

Tommy the Tooth grinned, flashing his pearly whites. "I had a 2:15 p.m. dentist appointment. I was there for at least an hour. It takes work to keep this winning smile!"

"I was at my banjo lesson until 3:30 p.m.," said Sally Strings. "I'm hoping to play with Miss Krystelle someday!"

Lipstick Lucy batted her eyelashes and poofed her wavy blond hair. "I went to the beauty parlor at about 1:00 p.m., and I was there for two hours. I DO look fabulous, don't you think, Chief?"

Each suspect's story is true. But only ONE of them could have made it to Logwood Island in time to commit the crime. Help Macros and Calcul find the thief.

Ferry Schedule

Depart Nashville	Arrive Logwood Island
1:10 p.m.	1:40 p.m.
2:00 p.m.	2:40 p.m.
2:30 p.m.	3:10 p.m.
3:10 p.m.	3:50 p.m.
3:40 p.m.	4:10 p.m.
4:00 p.m.	4:30 p.m.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Celebrate Faschingdienstag
Adventure #13

Macros and Calcul decide to head to Germany to celebrate Faschingdienstag in style! They attend parades, parties, and festivities galore. They see children and adults dressed as witches, clowns, jesters, and even wizards. Calcul is ecstatic about the amount of candy he receives, and Macros is happy to be among cheerful Germans.

Macros and Calcul start out their day at a parade at 9:00 a.m. They hang out for 2 hours before heading to a celebration at the city square. They dance and sing here for another 2 hours, before moving on to a parade that takes place in the Nahe River. They watch elaborate, yet goofy, floats pass by down the river for 3 hours. Macros and Calcul are exhausted after a long day of celebrating, and they head home. What time do they leave to go home?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Get Lost in the Bermuda Triangle
Adventure #14

Macros and Calcul head to Bermuda for some island fun. They relax, as well as complete some sight-seeing. One of the locals begins telling them tales of the Bermuda Triangle, a haunting patch of sea that is known for disappearances. Macros and Calcul's spines tingle as they hear about boats mysteriously disappearing in the middle of the ocean.

Macros and Calcul decide to go on an adventure to learn more about the unusual Bermuda Triangle. They set sail to see if they can not only uncover the secret, but also survive. They sail for 900 miles from Bermuda to Miami. They've made it safely so far, and they head from Miami to Puerto Rico for another 900 miles. Still alive and well, they make the final journey from Puerto Rico to Bermuda, which is 500 miles. What type of triangle is the Bermuda Triangle: equilateral, isosceles, or scalene?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul's Transformation
Adventure #15

Things get a little warped in the Bermuda Triangle for Macros and Calcul. They successfully made it down two lengths of the Bermuda Triangle, but odd and mysterious things begin happening once they begin traveling the third length from Puerto Rico back to Bermuda. The sky appeared to be glowing an unusual shade of purple, and the ocean swirled and whirled, letting out a slight howling sound.

Macros tried not to panic as he looked over at Calcul and began to realize that everything around him was backwards. "It's like looking at the whole world through a mirror," Macros thought to himself. He was very puzzled, but not alarmed, unlike Calcul who fainted upon the discovery of this new backwards world. What type of transformation are Macros and Calcul experiencing: a translation, a reflection, or a rotation? How do you know?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul and the Not-So-Bermuda Triangle
Adventure #16

Macros and Calcul woke up on their boat, assuming they were still stranded in the mysterious Bermuda Triangle. The world was no longer backwards, but instead, all the colors were a little off. The ocean was pale pink, the sky was lime green, and the boat had turned from a deep brown color to a blinding orange color. Macros and Calcul were extremely perplexed and wondered if they would ever make it out alive.

Macros and Calcul had found themselves in an alternate universe, traveling from Rico Puerto to Mudaber, and they had found themselves in a triangular path that was equally as chilling as the Bermuda Triangle. The distance from Rico Puerto to Mudaber was 500 miles, the distance from Mudaber to Mimia was 900 miles, and the distance from Mimia to Rico Puerto was also 900 miles. Is the triangle Macros and Calcul are in congruent to the real Bermuda Triangle? Why or why not?

The "Real" Bermuda Triangle

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

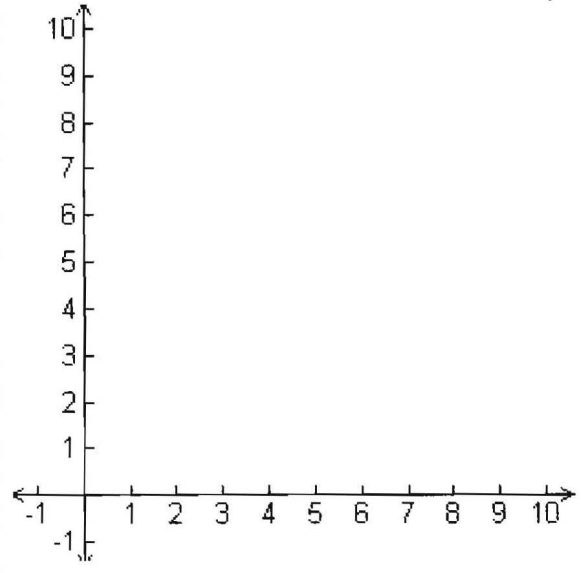
Problem of the Day:
Macros and Calcul Tour the Underground Railroad
Adventure #17

Macros and Calcul wake up again, but this time they find themselves in Fountain City, Indiana. They are dazed and confused as to how they managed to escape the Bermuda Triangle, and they do not remember how they made it out or how they ended up in Indiana. The world was no longer backwards, colors were back to normal, and Macros and Calcul were feeling better already!

Macros and Calcul found themselves in front of the Levi Coffin House. As they explore, they learn that Levi Coffin is often called the *President of the Underground Railroad* and his home is often referred to as the *Grand Central Station of the Underground Railroad*. After exploring, they move on to Dr. Richard Eells House in Illinois and the Milton House in Wisconsin. Their last stop is the Dr. Nathan Thomas House in Michigan. Use the ordered pairs given below to graph the locations and find what shape Macros and Calcul traveled in.

Location	Ordered Pair
Levi Coffin House	(8, 2)
Dr. Richard Eells House	(3, 2)
Milton House	(3, 6)
Dr. Nathan Thomas House	(8, 6)

Work Space:



Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:

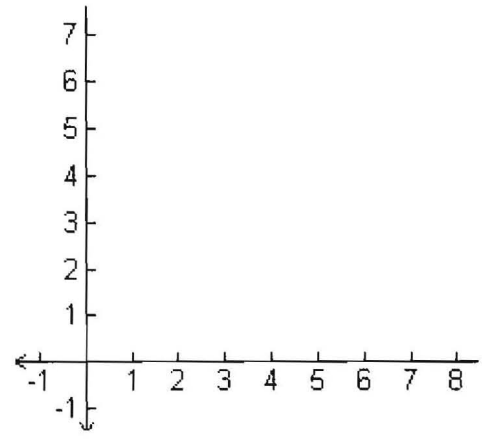
Leap Day!

Adventure #18

While hanging out in Michigan, Macros and Calcul catch sight of an evil warlock, Zamar, who has an infamous reputation for stirring up trouble. They eavesdrop on his telephone conversation, and hear that he is plotting to eliminate Leap Year Day! Macros and Calcul know that this would throw the world into a frenzy, by slowly shifting the calendar by 6 hours every year. After 100 years, that would mean the calendar would be off by about 25 days!

Macros and Calcul are determined to stop Zamar and save the day! They know that Zamar must travel around to pick up all the items he needs to abolish Leap Day and the shape he travels in is the magic word that can be used to end his evil plan. First he travels to the hardware store (4, 1) and then the PX (6, 3). Then he grabs a few more supplies from the arts and crafts store (4, 5) and gets his final supplies from the magic shop (2, 3). Plot the ordered pairs and connect the points to find the magic shape.

Work Space:



Final Answer:

Explain how you solved this problem:

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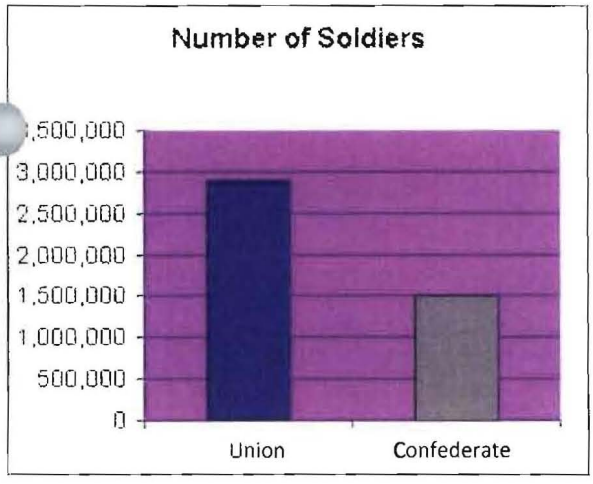
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Civil War Soldiers
Adventure #19

After Macros and Calcul successfully foil Zamar's evil plan to end Leap Day, they decide to go back to their historical touring. They enjoyed learning about the Underground Railroad and its history, so they decide to continue on a logical path around different Civil War battle sites. They begin at Fort Sumter, a practical choice, since this was the first official battle of the Civil War. They explore the site where the first shots of the Civil War were fired, and they wander around the fort in amazement.

Macros and Calcul head to a few other battlegrounds, including Antietam and Gettysburg. They learn about all the soldiers that fought over the 4 years that the Civil War lasted, including the 180,000 African Americans and more than 400 women that disguised their identities. Macros and Calcul also made sure to learn about both the Union and Confederate soldiers, and stumbled upon some interesting figures. Help Macros and Calcul use the bar graph to find out about how many more Union soldiers than Confederate soldiers there were in the Civil War.



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul's Encounter with the Cat in the Hat
Adventure #20

Macros and Calcul were called to the scene of the crime, and wondered, "Oh no! What happened this time?"

The scene of the doom was unfortunately Ms. Marshall's classroom. They looked all around, and do you know what they found? The books were spread across the floor in a swirling shape, while the tables were now covered in a purple shade of grape. The chairs were upside-down in every which way, and there sat the most terrible horror of all, clear as day. Ms. Marshall's Polish pottery smashed to bits, with poor Ms. Marshall trying not to have fits.

The horrified look in her eyes you could see, as she shouted, "Who did this? Who did this to me?"

The Cat in the Hat, along with Thing 1 and Thing 2, emerged from the bookshelf, all covered in glue. Ms. Marshall's eyes narrowed thin, and the cat and his crew knew how terrible was their sin.

"I don't know who did this, but I know you will pay. I will figure it out! I will catch you, I say!"

The Cat in the Hat, along with Thing 1 and Thing 2, stuttered and muttered, and the excuses in the air just flew.

"I may have played hopscotch with the books on the floor, but I promise, I promise, I did not break your décor," exclaimed a somber Thing 1.

"He's lying, I tell you! He's lying, you'll see! I promise, I am an innocent Thing 2!" shouted his brother with fun.

"I may have become slightly carried away, but I love the color purple, and I surely wish I could color tables every day!" began the Cat in the Hat.
"I may have danced from chair to chair, but it was just so much fun flying through the air! I did not break your pottery, this much I swear."

Macros and Calcul pat Ms. Marshall on the back, assuring her they will find out who is responsible for this atrocious attack. All the blame taken was known to be true, and Macros and Calcul knew that guilty were all in the crew. So who is the culprit? You know what to do. Use your knowledge to take down the Cat in the Hat, Thing 1, or Thing 2.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Put their Friends to Work
Adventure #21

After the mess the Cat in the Hat, Thing 1, and Thing 2 made in Ms. Marshall's room last week, Macros and Calcul decide to make their friends work to make up for all the damage they caused. The hooligans colored the tables, knocked over the chairs, pulled the books on the floor, and broke Ms. Marshall's Polish pottery. Now that the fun and games are over, they must clean up their mess.

They first get to work cleaning and scrubbing the tables, which takes about 2 grueling hours. After that, Thing 1 and Thing 2 pick the books up off the floor and place them back on the bookshelf. This takes them about 2 long hours. While Thing 1 and Thing 2 pick-up, the Cat in the Hat fixes the chairs and sets them right-side-up, which takes him about 1 hour. The final task is to make Ms. Marshall a new piece of pottery. This is a little more difficult, and it takes the crew 3 hours. On average, how long does it take the crew to right each of their wrongs?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Celebrate Oreo's Birthday!
Adventure #22

Macros and Calcul are big Oreo fans, and they know Miss Weck is too. They head to Miss Weck's house for one of the biggest celebrations of the year: Oreo's 100th birthday! The first Oreo was born in 1912 in New York City, and after the successful 100 years Oreo has had since then, it would be a crime not to party!

At the party, Miss Weck provides each guest with a handful of Oreos. Unfortunately, in her excitement, she does not count how many Oreos each guest gets, and everyone get approximately the same number, but not the exact same number. Macros is indifferent, but Calcul is not content. Help Calcul find the mode and median of the group of Oreos so he can attempt to fix Miss Weck's error.

Guest	# of Oreos
Macros	4
Calcul	6
Ms. Marshall	5
Miss Weck	4
Rosa Parks	3
Claudette Colvin	4
Martin Luther King, Jr.	5

Work Space:

Final Answer:

Explain how you solved this problem:

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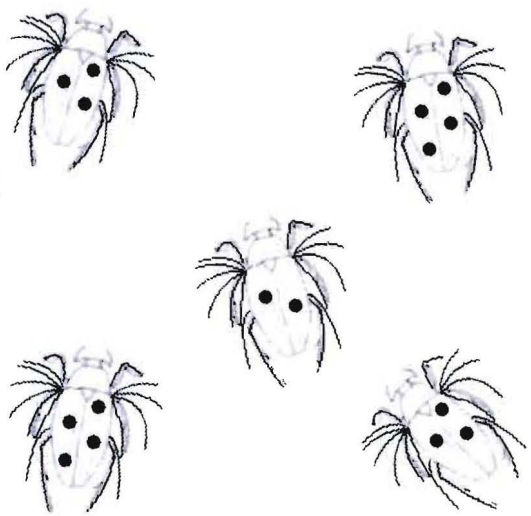
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul's Bug Hunt
Adventure #23

Macros and Calcul are out wandering around in the woods, when they discover a blue and green spotted creepy, crawly bug. They have never seen a bug quite like it, and they decide to go on a hunt to see if they can discover any more leggy friends. They head through the forest, and with their eyes on the ground, rather than the tops of the trees reaching up to the clouds, they encounter even more unique creatures.

Macros and Calcul take a photograph of each of the bugs they see. They find five unusual insects, each covered in spots. They all have more legs that Macros and Calcul can count, so they decide to classify them by their number of spots. Use the images below to find the median, mode, and range of spots on the crawling bugs.



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul at the Lorraine Motel
Adventure #24

Macros and Calcul decide to make another quick stop in Memphis to take a look around the National Civil Rights Museum. They are interested in learning more about the people and events that were a part of the Civil Rights Movement. They walk through the bus Rosa Parks was arrested on, and they see the room at the Lorraine Motel where Martin Luther King Jr. was staying prior to his assassination on April 4, 1968.

Macros and Calcul already know that Rosa Parks was arrested in 1955, and that the Montgomery Bus Boycott began just 4 days later. Using the information they now know about Martin Luther King Jr.'s assassination, help Macros and Calcul compute how long after Rosa Parks' arrest it occurred. Use this equation to help find the answer: ***n + 1955 = 1968***.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Uncover the Secret of E-Quation the Great
Adventure #25

Macros and Calcul decide to visit a magic show for a little fun. They have heard wonderful reviews about E-Quation the Great, and they simply must see for themselves if he really is as amazing as they've heard. They sit and wait in anticipation for the great magician to take the stage.

"Good evening, ladies and gentleman," said the magician proudly. "Let me introduce my lovely assistant, Polly Gone." Polly stepped gracefully on to an enormous balance scale, and it lowered to the floor. E-Quation continued: "Now, a gentleman would never ask a lady her weight, but in this case, it's essential to my magic! Polly, could we ask you how much you weigh?"

"Certainly! I weigh 120 pounds," replied Polly. E-Quation then raised a white rabbit above his head: "Ladies and gentleman, this rabbit weighs a mere 2 pounds. Let's see how this furry animal measures up to Miss Polly Gone." At that, he took off his top hat, lowered the rabbit inside, and placed both on the other scale of the balance.

Suddenly, the lights dimmed and E-Quation raised his arms, exclaiming: "Magic scale, hear me tonight: make light become heavy, and heavy become light!"

The audience was not prepared for the magical sight that appeared: Although Polly and the rabbit in the hat were on opposite scales, they seemed to be perfectly balanced. The magician whirled around with both arms raised in a gesture of triumph, and the audience jumped to their feet and applauded wildly.

Macros and Calcul knew, better than anyone, that a magician never reveals his secrets, but in this case they just had to ask. After the show, they snuck backstage and summoned up the courage. "Mr. E-Quation the Great," Macros began. "Would you tell me how you did your last trick?"

"I can only reveal two little hints: It involves magic weights and ALGEBRA!"

Help Macros and Calcul uncover his secret! Choose the following equation that best describes E-Quation's trick and find how heavy the weights are.

A. 120 + 2 = m
B. 120 x 2 = m
C. 120 = 2 + m
D. 120 / 2 = m

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Enjoy Tea with the Queen
Adventure #26

News of Macros and Calcul's defeat of the evil warlock Zamar to save Leap Year Day makes its way to Queen Elizabeth II of England. The queen is a big fan of Leap Year Day, as well as the balance it brings to the world, and she is extremely grateful for Macros and Calcul's bravery. To show her gratitude, she invited the pair to Buckingham Palace for tea.

Macros and Calcul didn't find their actions to be particularly courageous, but they have no intention of turning down an offer from the Queen. They are eager to travel to England, and even more thrilled to have the opportunity to explore the palace. They arrive at Buckingham Palace at 3 p.m. and take an hour long walk through the Queen's gardens before sitting down for tea with the Queen herself. Tea lasts for 2 hours, and then Macros and Calcul are gracefully escorted out of the palace. What time did the duo leave their exciting experience at Buckingham Palace?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Visit Stonehenge
Adventure #27

Macros and Calcul decide to take a day trip to Stonehenge, due to its close vicinity to London. The drive takes a little over an hour and a half, and Macros' excitement begins to swell as they near Salisbury. Calcul is not sure what all the fuss is about, and he is unenthusiastic about a trip to see a pile of large rocks. Macros tells Calcul that he is in for a surprise, but Calcul simply rolls his eyes and waits for the car ride to end.

Macros was, of course, correct, and Calcul cannot believe his eyes as he flies up towards the prehistoric monument. He is amazed at the circular placement of the colossal rocks, and wonders how on earth anyone could have created such a unique monument thousands of years ago, without the technology of today's world. Calcul is most amazed by one particularly immense rock, which he measures to be about 100 ft long and 30 ft high. What is the perimeter of Calcul's favorite rock?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Celebrate Pi Day!
Adventure #28

To celebrate Pi Day, Macros and Calcul head to Scotland for some bagpipe excitement! They are lucky enough to stumble upon a festival when they arrive in Edinburgh, and they join in the merriment as people dance, sing, and eat Scottish beef. Macros and Calcul are amazed by the hearty bagpipes as they produce vibrant sounds.

Macros and Calcul sneak up for a closer inspection of the bagpipes. They notice that there are three drones, in addition to a blowstick and chanter. Calcul wonders how such long drones can stand up so tall without falling over. Out of curiosity, he decides to ask one of the bagpipe players if he can measure the drones. The player agrees, and Calcul finds that the bass drone is 1.8 feet tall, and the two tenor drones are each 0.92 feet tall. Round each drone to the nearest foot and estimate the combined height of all three drones.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
A Kiss on the Blarney Stone
Adventure #29

Macros and Calcul travel over to Ireland and make their way towards the village of Blarney. They have heard stories about the Blarney Stone, which can be found in the castle located there. Rumor has it that kissing the stone will give you eloquent speech, or the gift of gab, as many call it. Calcul already feels like he is enough of a sweet talker, but he figures it couldn't hurt just to try.

Macros and Calcul learn a great deal about the Blarney Castle while they wait their turn to kiss the Blarney Stone. They are surprised to find that this castle is actually the third castle to be built on this site. The first building was made from wood in the tenth century, while the second castle was made out of stones around 1200 A.D. The second castle was later demolished, and the stone castle Macros and Calcul see today was built in 1446 A.D. How many years after the second castle was constructed was the third castle built?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Paddy the Leprechaun at Peculiar Zoo
Adventure #30

Macros and Calcul head to in Dublin, Ireland and make a stop at the Peculiar Zoo, home of the strangest animals to roam the Earth! As soon as they got there, however, they discovered that earlier that day, someone had taken off with a few of the zoo's most precious animals.

"Oh, dear!" cried Hank McGoo, the head zoo keeper. "I came in this morning to feed the animals, but my favorite animals have vanished from their cages! The colorful 3-feathered peacocks . . . the kangaroos with two pouches . . . those prized 5-spotted leopards . . ."

"Now, now," Macros said, trying to calm him. "How many animals are missing in all?"

"I don't know," he whimpered. "I never thought of counting them!"

Macros and Calcul searched the zoo for clues and found a crumpled note in the kangaroo den:

Dear Mr. McGoo, have I got you —
I've taken your animals to start my own zoo!
My zoo will be the grandest around,
With the strangest animals ever found.
Folks will come to see the kangaroos
With 14 pouches, how could I lose?
The leopards will be the biggest hit of all —
With 25 spots, they're off-the-wall!
9 precious peacock feathers will make me rich.
As long as my plan goes off without a hitch!
Signed,
Paddy the Leprechaun

"What a mischievous scoundrel!" cried Mr. McGoo.

Work Space:

Final Answer:

"We can help you," Macros told him, "but first we have to figure out how many of each animal he's stolen from the Peculiar Zoo."
Help Macros and Calcul figure out how many peacocks, leopard, and kangaroos are missing.

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Hide Out
Adventure #31

Zamar, the evil warlock, is out for revenge, after discovering that it was Macros and Calcul who foiled his attempt to abolish Leap Day a few weeks ago. He is not happy, and he sends word out that he is determined to find the culprits. Macros and Calcul know just how evil Zamar can be, and they know that they will be doomed unless they act fast. They head towards the thick forests of Zauberland, and hope for the best.

Macros is able to use his magic staff to conceal his figure and make himself invisible, but he is not able to extend this power to Calcul. He isn't worried, though, because he knows he can use his adaptation skills to camouflage with the tree branches. Calcul must sit very still, in order to blend in, and he decides to pass the time by counting tree branches. He quickly discovers a pattern to the number of branches that split off from the trunk. There are 8 main branches, and each main branch has 5 smaller branches that split off from it. How many branches are there total on the tree Calcul is hiding in?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Calcul Takes Flight
Adventure #32

Macros and Calcul misjudged how long it would take to conquer the steep and windy paths of the forests of Zauberland for someone unfamiliar with the trails. They found themselves waiting for an incredibly long time for Zamar to pass through, and Calcul found it hard to wait patiently. Once he had finished counting all the branches in the nearby trees, he found he needed something else to do to keep his mind occupied. He knew he simply could not sit still and wait in the trees any longer, so he asked Macros to listen for any sign of Zamar while he did a little stretching.

Calcul flew out of the tree and headed to the ground. Once there, he flew as fast as he could up to the top of the tree. He zoomed up and down, trying to see how fast he could make it to the top. While he was flying free, Calcul decided to measure the length of the tree using his wingspan. What customary unit of measurement was most likely the closest to Calcul's wingspan: 1 inch, 1 foot, 1 yard, or 1 mile?

Work Space:

Final Answer:

Explain how you solved this problem:

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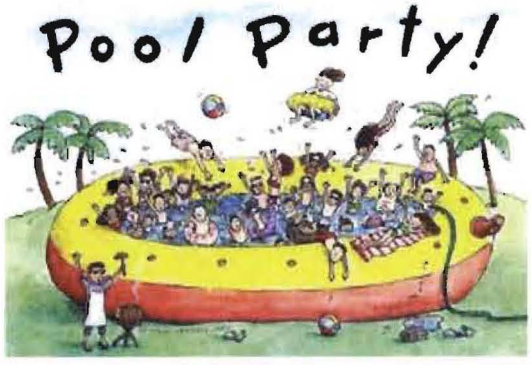
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Go for a Dip
Adventure #33

Macros gave a quick whistle at Calcul as he heard Zamar finally approaching. Calcul quickly nestled himself into his camouflage position, high up in the tree. They heard the crunching of leaves as Zamar came near, grumbling and panting, frustrated that he had not yet been able to locate his enemy. Their camouflage worked magnificently, and Zamar failed to spot the pair, in his frustrated warpath through the forest. Macros and Calcul are relieved to have kept out of sight from Zamar, and they are hoping he doesn't come back their way anytime soon.

Calcul decides that they deserve a party for outwitting the evil warlock, and he proposes a refreshing pool party. Macros is not a strong swimmer, and he is not on board with this idea right away. Calcul says they will find a pool that is a suitable size for him, and Macros agrees to join the pool party, but only if there is less than 400 quarts of water in the pool. Calcul has no intention of measuring a large pool with quarts, and he decides to measure it using gallons, instead. What is the maximum number of gallons of water that could be in the pool?



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Travel to the Middle of the World
Adventure #34

After their refreshing pool party, Macros and Calcul head to the *Mitad del Mundo*, also known as *Middle of the World*, in Quito, Ecuador. The park lies on the equator, giving it this appropriate name. They visit the museum there to learn about the history and culture of Ecuador, and afterwards, they wander around until they find a large monument. This monument marks where the equator runs through Quito, and they spy the bright line that runs down its east side, marking the boundary between the Northern and Southern hemispheres.

Macros and Calcul feel overjoyed and thrilled to be standing in the middle of the world, and they eagerly straddle the line, like many other tourists they encounter, so that they are standing in both hemispheres at once. Calcul decides to follow the line, and he takes a short flight around the equator. While in the air, he catches a glimpse of the massive globe on top of the monument. He estimates that it is about 5 yards across. If 1 yard is equal to 3 feet, how many feet across is the globe?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul in the Cafegymatorium
Adventure #35

Macros and Calcul took some time out of their not-so-busy schedule to have lunch with Ms. Marshall's class at Wetzel Elementary School. When they arrived at the scene, they were immediately swept down the halls and into cafegymatorium chaos. A group of students sat at a lunch table staring unhappily at their trays.

"YUCK!" cried Raven, making a face at the slice of pizza in front of her. "I can't stand pepperoni!"

"Don't look at me," pouted Ryan. "I hate any food with cheese on it." At that, he pushed away his cheeseburger.

"Hey, anybody want these chicken wings?" asked Duriae. "I don't like anything with meat in it."

Michael scooped up a spoonful of his yogurt and grumbled, "Everybody knows I'm allergic to this stuff."

"Well, yogurt is the only thing I like on the menu," replied Chloe. "And there's no way I'm going to eat THIS!" At that, she poked her salad with a fork.

"Looks like you're all unhappy with your lunch," remarked Macros.

"It's the new cafeteria lady, Ms. Maxy Mix-up," said Raven. "She's mixed up all our favorite lunches and we're having trouble sorting it out."

"Don't worry," Macros stated. "Calcul and I are here to help get the orders straight!"

Help Macros and Calcul untangle this lunchtime knot. Each student has a favorite food. No two students share the same favorite. Your job is to match the student with his or her favorite food.

Work Space:	Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul at the Aquarium
Adventure #36

Macros and Calcul head to Atlanta, Georgia to visit the largest aquarium in the world. Rumor has it that the aquarium contains more animals than any other aquarium in the world, and there are over 10 million gallons of water, filled with extraordinary creatures. Macros and Calcul simply must see what all the fuss over whale sharks and beluga whales is about, and they follow the crowd into the busy aquarium.

Macros and Calcul are absolutely astonished as they make their way through the ocean voyager exhibit. They stare in amazement at the massive manta rays and the wonderful whale sharks, and they can't believe their eyes! They feel just like scuba divers, as they walk through a transparent tunnel and the fish, and other ocean creatures, swim right over their heads. Macros and Calcul have never experienced anything quite like this. Macros is curious how much water is in the ocean voyager tank, and he decides to ask an aquarium worker. Help Macros finish his question:
"How many _____ of water are in this tank."

Work Space:

Final Answer:

Explain how you solved this problem:

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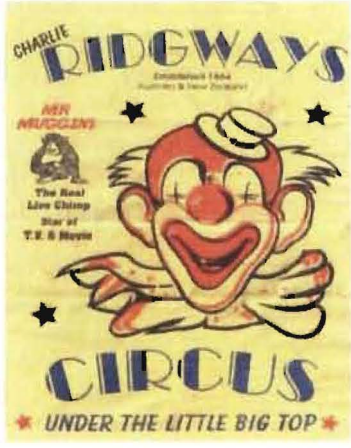
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
The Day the Circus Came to Town
Adventure #37

After seeing a flyer for a world-class circus, Macros and Calcul decide to stay in Atlanta for another day to see the great show. Elephants, acrobats, and peanuts are just a few of Calcul's favorite things, and Macros wouldn't mind getting a good laugh from watching some clowns pull goofy pranks on each other. Off to the circus they go, ready to see a spectacle.

Macros and Calcul thoroughly enjoy the show, and they are quite pleased with the entertainment the circus provided. Macros decided that his favorite part of the show actually turned out to be the trapeze artists. Calcul stuck with his decision that elephants were his favorite, after watching a flexible performer, covered in sparkles and shine, show off some amazing tricks on the back of one of the large elephants. Calcul is curious as to how heavy the performer on the elephant's back is and if she hurts the elephant by standing on his back. If Calcul were to weigh both the performer and the elephant using customary units, would he use the same unit for each? Why or why not?



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul and the Great Pyramid of Giza
Adventure #38

Macros and Calcul decide to travel to the other side of the world for their next adventure. They decide to make their way to the Great Pyramid of Giza, also known as Khufu's Horizon, in Egypt. They can't wait to set their eyes on the oldest of the Seven Ancient Wonders of the World, and they are ecstatic about having the chance to see the 2.3 million blocks of limestone that create the towering tomb for the great Egyptian Pharoah Khufu.

Macros and Calcul are absolutely astonished by the sheer immenseness of the pyramid! They simply can't fathom the concept of being so important that your people spend 20 years constructing such a massive monument for you. The pair sneaks into the King's Chamber, where they find a sarcophagus, which peaks their interest even more. The rectangular chamber is approximately 12 yards long and 6 yards wide. Help Macros and Calcul find the perimeter of the room in feet.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul and the "Lost" Pyramid of Giza
Adventure #39

Macros and Calcul hear whispers about a fourth pyramid of Giza, and they can't leave just yet. According to the locals, Djedefre was the son of Khufu, and for thousands of years, they simply thought his pyramid was unfinished. Some believe, however, that Djedefre's pyramid was once the grandest pyramid of all. The locals cannot say for sure why his pyramid is now a pile of mud and stone, but theories include destruction by the Roman Empire and grave robbers.

Macros and Calcul have to get a closer look at this 'lost' pyramid and they convince a local archaeologist to guide them. It is quite a task to make their way into the ruins, but they discover that the hassle was most definitely worth it. They are standing in history that many people do not know even exists! The tomb has been cleaned out by robbers, but Macros manages to find a unique vase that is still intact. He estimates that its capacity is about 4 pints. Calcul asks Macros how many cups the vase holds. Help him find the answer.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

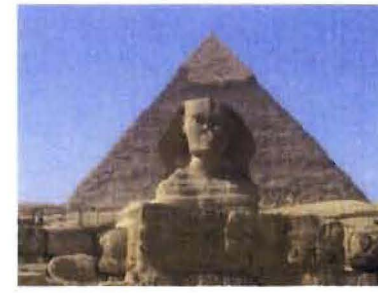
Date: _____ Name of Apprentice: _____

Problem of the Day:
The Great Sphinx Gets a Nose Job
Adventure #40

Macros and Calcul knew they couldn't leave Egypt without exploring the Great Sphinx of Giza, and they decided to set out for the Egyptian ruins one last time. They had to get up close and personal, of course, but they had no idea how much of an adventure this would lead them on.

As Macros and Calcul were snooping around the sphinx, they noticed a small opening that was visible behind the sphinx's back left paw. Calcul thought he could squeeze in, and the duo decided to go for it. Calcul flew in, while Macros used his magic staff to teleport himself inside.

They found themselves in a small, cave-like room, with the walls covered in hieroglyphs. They stared in amazement, wondering what they all meant. Macros used his magic staff to decode the glyphs, and a message suddenly appeared before them.



"You who are so bold as to enter my lair,
are adventurous, and so I shall share,
a chance to travel
to places you never could have known
and you will see what most have never been shown.
Chant these words
and transport you will,
hold on tight because you are in for a thrill."

Magnus, colossus, oh mighty art thou. Courage and bravery, these I vow.

Macros and Calcul chanted the words, and suddenly found the world spinning around them. The walls disappeared and they were thrown through the air, falling onto the sand. It appeared as though the cave had simply spit them out, for the landscape looked about the same as where they had just entered.

Suddenly, Calcul noticed something! He saw a man hanging off the sphinx's face, chiseling away at his nose. He quickly flew towards the man, in an attempt to scare him away. Unfortunately, he was too late. As he neared the sphinx's face, his nose clattered noisily to the ground.

Calcul was appalled at the crime, and made the decision to fix the sphinx. Before he could begin, he had to find the area of the triangle where the sphinx's nose attached to his face, in order to know how much super glue he needed. He flew to the nose on the ground and began measuring. He found that the base of the nose was 12 inches, while the height of the nose was 36 inches. Help Calcul find the area of this triangle.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul in the Amazon Rainforest
Adventure #41

Macros and Calcul made their way to the Amazon Rainforest in South America. They heard that there are over 1 million species of plants there, and they would love to see these producers for themselves. They find out that the Amazon Rainforest is so large that is covers almost the same amount of space as the whole continental United States! They can't wait to experience their first part of such a vast, unique ecosystem.

It is not raining when Macros and Calcul arrive, but they hear that it rains about 250 days a year. That's about 70% of the entire year! They are curious to know how much rain falls each year, and they ask a villager. They are absolutely shocked when they hear his answer, and they calculate that the Amazon Rainforest receives about 162 centimeters more rain than Baumholder, Germany does each year. If the average rainfall for Baumholder is 88 centimeters, what is the average rainfall for the Amazon Rainforest?

Work Space:

Final Answer:

Explain how you solved this problem:

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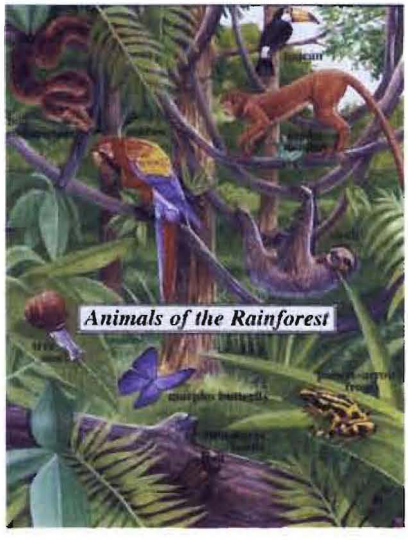
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Hopping, Swinging, and Slithering Friends
Adventure #42

Macros and Calcul are curious to learn more about the Amazon Rainforest and the animals that inhabit it. They can't wait to catch sight of some of the thousands of animal species that dwell in the four layers of the rainforest, and their goal is to identify as many as they possibly can. They plan to keep an eye out for everything from tiny insects to hefty mammals.

The first animal the duo encounter is a slithering boa constrictor. Calcul is frightened by the reptile, but Macros is intrigued and goes in for a closer look. While Calcul flies up to escape from the massive snake, he runs into a spider monkey swinging through the trees. As he meets back up with Calcul to describe what he saw, a brightly colored poison dart frog catches his eye. The pair decides to record their findings, and they pull out their metric rulers. What metric units of length should they use to measure each of the different animals they found?



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Orchids in Bloom
Adventure #43

Macros and Calcul are not only amazed by all the animal life in the rainforest, but they are also astounded by the bright, beautiful plants they see. Flowers in every color imaginable and trees that soar into the sky surround Macros and Calcul, and they are in awe of all the producers that thrive in this warm, moist ecosystem.

Macros stumbles upon a cluster of vivid pink orchids, and is enthralled by their beauty. He is entranced by their clean symmetry and unique shape, and he can't help but take a closer look. He finds that the orchids have an extremely large root system, and he notices that this appears to help them store water. He finds 436 mL of water stored in one orchid's roots, 239 mL in another orchid's roots, and 171 mL in yet another orchid's roots. How much water did he find stored by the orchids in all?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Just Floating Along
Adventure #44

Macros and Calcul decided to pull themselves away from the Rainforest and take a ride down the Amazon River itself. Calcul insisted that they travel by canoe to make their journey more adventurous. Macros is a little uneasy at first, but Calcul persuades him that it could be fun. Calcul promises that it will make them feel much more like true explorers.

Macros and Calcul encounter pink Encantado dolphins, and numerous other unique creatures, as the river winds and twists its way through South America. They travel through Brazil and make their way towards the great Andes Mountains in Peru. Macros finds that he feels quite safe in their wooden canoe, and he is at ease on the river. The canoe they are in weighs 13 kilograms. If 1 kilogram weighs 1,000 grams, what is the weight of the boat in grams?

Work Space:

Final Answer:

Explain how you solved this problem:

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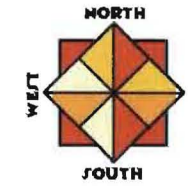
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Save Spring Break!
Adventure #45



As Macros and Calcul were cruising down the Amazon River, they received an urgent message about some terrible news! Miss Weck called to inform them that Zeke, the brother of the evil warlock Zamar, is playing pranks in every city he visits, in an attempt to ruin the start of Spring Break for all students at Wetzel Elementary School. When he shows up in a town, shapes suddenly become switched!

It started in Baumholder, where there were reports that the rectangular office buildings had been changed into Egyptian pyramids!

The next report came from Frauenberg, a town 3 miles north of Baumholder. Town officials reported that Zeke had created a stir in their library. He switched all the square books with round dinner plates!

The next town that fell victim to Zeke was Birkenfeld, a town west of Frauenberg. Citizens there claimed that the sinister tricksters changed all the pizza slices into playing cards!

Zeke was last spotted heading south from Birkenfeld.

Macros and Calcul know there is no telling what Zeke will do next, but there is a way to catch him. Zeke can only travel in a path that forms an exact rectangle. Each corner of the rectangle is a town he visits. Plus, Zeke can only travel 14 miles a day before he loses his shape-changing power.

Help Macros and Calcul save Spring Break by finding where Zeke will head next. You know that one length of Zeke's journey was 3 miles. You also know that the length of his total journey will be 14 miles. Now use what you know about rectangles to discover which town he is planning to visit.

Where will Zeke appear next?

A. Ruschberg, 3 miles west of Baumholder
B. Nohfelden, 4 miles south of Birkenfeld
C. Neubrücke, 4 miles west of Baumholder
D. Ellenberg, 4 miles west of Frauenberg

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
A Grand Time at the Grand Canyon
Adventure #46

Macros and Calcul decide to make their way back to the states and go for a tour out west. Calcul has always dreamed of visiting the Grand Canyon, and Macros is also excited to see what adventures are in store in the American West. With a flick of the wrist, Macros' magic staff whirls them away, and a vast canyon slowly comes into view.

Neither one is let down when they encounter the sheer magnitude of the Grand Canyon, which has been created over the course of 17 million years. The Colorado River has eroded through layer upon layer of rock to create this 277-mile long canyon. It is over a mile deep, and Calcul decides he must make his way down. He chooses to fly, while Macros prefers to use his magic staff. It takes Macros only 1 minute to make it to the bottom using magic, but it takes Calcul 13 minutes to fly down. If they both left at 11:05 a.m., what time will each of them arrive at the bottom?

Work Space:

Final Answer:

Explain how you solved this problem:

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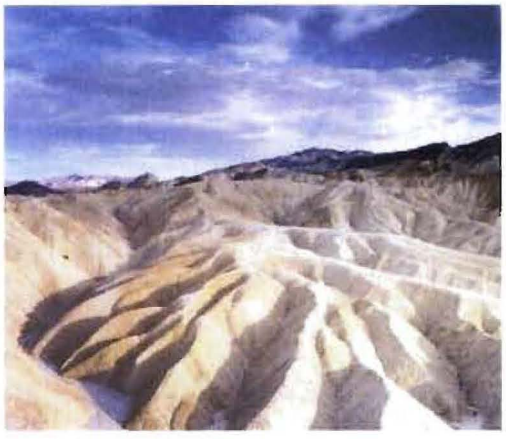
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Take on Death Valley
Adventure #47

Macros and Calcul move further west towards the Mojave Desert in Southern California. The desert was named after the Mohave tribe of Native Americans, and is known for the unique Joshua Trees that thrive in the open grasslands. Macros and Calcul specifically make their way to Death Valley, which contains some of the hottest and driest locations in North America.

Macros and Calcul find it astonishing to learn that the highest temperature ever recorded in Death Valley was 134°F. They have never felt this kind of heat before, and they are grateful that the average temperature for Death Valley in April is about 75°F. The duo decides to explore Death Valley, including Badwater Basin, the lowest point in North America. If they spend 3 hours wandering through the valley, how many minutes did their exploration take?



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Rings of Wisdom
Adventure #48

Macros and Calcul decide to aim for higher heights, and find themselves at Mount Whitney, the highest point in the Continental United States. Mount Whitney lies in Sequoia National Park, which contains 5 out of the 10 largest trees in the world. Macros and Calcul find themselves surrounded by 200,000 acres of giant, beautiful sequoia trees.

While at the park, Macros and Calcul get a lesson on how to determine the age of a tree. Their guide teaches them how to look at the pattern of tree rings and count these rings to find out the age of a tree. They learn that some of the trees are over 2,000 years, or 2 millenniums, old, and they have the opportunity to discover the age of a tree themselves. They use tree ring patterns (and a bit of magic to make the counting go by quicker) to find out that their tree is about 900 years old. For how many centuries has this tree been growing?

Work Space:

Final Answer:

Explain how you solved this problem:

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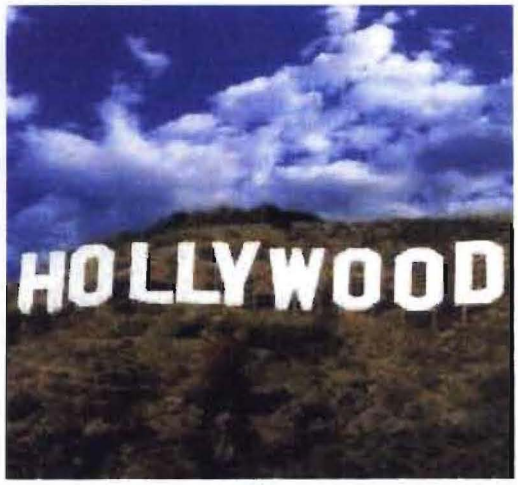
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Go to Hollywood
Adventure #49

Macros and Calcul mix things up a bit and take a short break from nature to go in search of movie stars. The duo head towards Hollywood to see what the "Entertainment Capital of the World" has to offer. They eagerly await movie studios and movie stars, as well as the world-famous Hollywood Sign.

Their first destination is the Hollywood Walk of Fame, a collection of over 2,400 stars decorating the sidewalks along Hollywood Boulevard. The stars are to celebrate the success and importance of musicians, actors, producers, and many others who have contributed to entertainment. Macros and Calcul begin the 1.3-mile journey from one end of the Walk of Fame to the other at 1:00 p.m. If it takes them 1 hour and 45 minutes to complete the walk, what time do they reach the end?



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Animal Fun at the San Diego Zoo
Adventure #50

Macros and Calcul figured they might as well head back down to Southern California to make a quick stop at the San Diego Zoo. The zoo has over 4,000 animals, including pancake tortoises, Asian elephants, and giant pandas, and Macros and Calcul can't wait to see them all!

Macros and Calcul know they have a lot of ground to cover with so many animals to see, and they decide to arrive at 9:00 a.m. They first spend 2 hours at the Monkey Trails exhibit, where they chat with mandrills and mangabeys, before heading to the Rainforest Aviary to see the tropical birds. They take some time to examine lories and woodpeckers, and they spend 1 hour here.

Macros and Calcul head to Polar Bear Plunge and Elephant Odyessey next, and they spend 3 hours between the two, watching arctic animals, such as polar bears and caribou, and comparing African and Asian elephants.

The pair realizes they are running out of time, so they spend only 1 hour at the Gorilla Tropics and 1 hour at Tiger River. Do Macros and Calcul have time to visit the exceptional Panda Trek before the park closes at 6:00 p.m.?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Experience Midnight Sun
Adventure #51

Macros and Calcul need a cool break from all the warmth of the American West, so they travel to the Arctic. They land in Svalbard, a small group of Norwegian islands inside the Arctic Circle. They are intrigued by the glaciers that cover the islands, as well as the nature parks full of reindeer and seabirds.

Macros and Calcul are most excited about the midnight sun phenomenon that occurs in Svalbard at this time of year. They are so far north that the sun is still visible at midnight. With good weather, the sun can be seen 24 hours a day! This midnight sun wonder lasts about 99 days each year. If there are 365 days in a year, how many days is there no midnight sun?

Work Space:

Final Answer:

Explain how you solved this problem:

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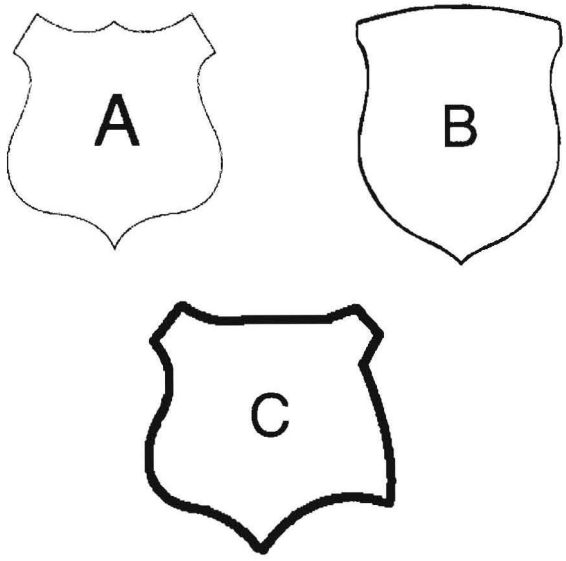
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Shipbuilding 101
Adventure #52

Macros and Calcul plot Stockholm, the capital of Sweden, as their next destination. Stockholm is the largest city in Sweden, but it is actually made up of 14 small islands on Sweden's eastern coast. One of Stockholm's great attractions is the Vasa Museum, which contains a Swedish warship, the Vasa, and Macros and Calcul decide to begin their adventure here.

The Vasa was considered to be the most powerful warship at the time that it was built in 1626. Unfortunately the ship had numerous flaws that caused it to sink less than 30 minutes after setting sail in 1628. One of the problems with the ship was that two different crews constructed the left and right sides of the ship and the ship frame was not symmetrical. Use the symmetry in the images below to help Macros and Calcul determine which ship was the Vasa.



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Welcome to the Happiest Country in the World!
Adventure #53

Macros and Calcul were in awe of the massive Vasa and they decide to set sail themselves. They travel southwest to Denmark, through the chilly Baltic Sea. They know it will be a great trip, especially because they have heard that Denmark is often ranked as the happiest country in the world. They know that happiness is contagious, and they hope to catch it!

Macros and Calcul find that interesting things happen with the sun here, just like in Svalbard. Due to its northern location, Denmark typically has exceptionally short winter days and long summer days. Today, the sun rises particularly early around 6:00 a.m. and sets at 8:15 p.m. How many hours of sunlight were there for Macros and Calcul today?

Work Space:

Final Answer:

Explain how you solved this problem:

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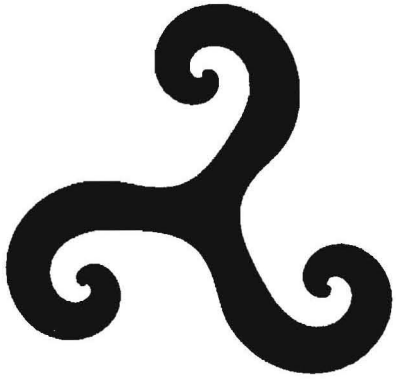
Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Experience the Wattenmeer
Adventure #54

Macros and Calcul make their way into Germany, and as they trek around the coast of the Baltic Sea, they find their toes squishing in mudflats of the Wattenmeer. The coastline is very unique, with extreme high and low tides. During low tide, mudflats extend far out into the sea, but when high tide rolls in, the water quickly covers this area back up.

They do some exploring during low tide, and discover a variety of living and non-living creatures, including snails and empty shells. Calcul also discovers a clump of seaweed, spread out in an interesting shape. Use the illustration below to help Calcul determine if the seaweed's shape has line symmetry or rotational symmetry.



Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
The Case of the Bell Clapper Snatcher
Adventure #55

Macros and Calcul traveled west to Oslo, Norway, but they found that an eerie hush had fallen over the city. Instead of the usual cheerful chime of the church bells at 10 a.m., there was only silence. They flew to the Oslo Cathedral, where they discovered that someone had snatched the bell's clapper! Without the clapper that swings inside the bell, there is no way for it to ring.

Macros and Calcul buckle down and get to work, quickly coming up with a number one suspect: Silent Sam. The locals all know that Sam likes things very, very quiet. They say that for years, Sam has written to the local newspaper complaining about the church bells.

As luck would have it, Macros and Calcul found Silent Sam leaving the Stay Fit Gym.

"Sam," Macros said. "May I ask you a few questions about the church bell's clapper?"

They knew he was up to something, so Calcul swooped into the pocket of Sam's gym bag and discovered a locker key. "Sam, did you hide the bell clapper in a gym locker?" Macros asked.

Sam knew he was caught. He looked down at the ground and slowly nodded "yes."

Macros questioned him. "What's the number of the locker where we can find the bell?"

Suddenly, a sly smile crossed Sam's face and he held up five fingers.

Oh no! Sam was only going to answer five questions to help Macros and Calcul figure out the locker number. Plus, he could only answer "yes" or "no"!

Macros decided to play along. "All right, Sam, but I warn you — no funny business! Here's my first question: Is the number less than 50?"

Sam nodded "yes."

"Is the number less than or equal to 25?"

This time, Silent Sam shook his head "no."

"Is the number odd?"

Sam was getting a little nervous. He quickly nodded "yes."

"Is the number a multiple of 5?"

Again, Sam nodded "yes." I could tell he was beginning to panic.

"Is the first digit odd?"

Sam nodded "yes" knowing the game was over.

What is the locker number where Silent Sam hid the key?

Work Space:

Final Answer:

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Make Dreams Come True
Adventure #56

Macros and Calcul decide to include Miss Weck in their plans this week. They let her choose their next destination, and she admits that she dreams of visiting the Greek island, Santorini. She gushes about the white-washed stone houses, and the beautiful blue church domes that mirror the blue of the sea. Macros and Calcul immediately set off to make Miss Weck's dream come true.

Macros and Calcul know they made a good choice by listening to Miss Weck, and they are astounded by the beauty that greets them when they arrive. They learn that this magnificent island came to be as a result of an intense volcanic eruption. This eruption caused land to collapse, creating a caldera, which is now like a rectangular lagoon of water. If this lagoon is 12 kilometers (km) long and 7 kilometers (km) wide, what is the surface area of the lagoon?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Island Hopping
Adventure #57

Since they were so impressed with Santorini that Macros, Calcul, and Miss Weck decide to explore some of the other Greek islands. They hop from the ancient ruins of Knossos in Crete to the Acropolis in Rhodes, and then on to many other sites of ancient Greek ruins. They are amazed by the massive reminders of how Greece was thousands of years ago.

They learn very quickly that they cannot possibly cover all of the Greek islands, because there are simply too many. Even though not all of the islands are inhabited by people, there are still 6,000 islands that are a part of Greece. People live only on 227 of these islands, which they are amazed to discover. Miss Weck then wonders how many of the Greek islands are **not** inhabited by humans. Help her find the answer.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul Visit the Parthenon
Adventure #58

After their endless island hopping, Macros, Calcul, and Miss Weck hit the mainland to visit Athens, the capital of Greece. They are excited to see one of the world's oldest cities that has been around for about 3,400 years! They can't wait to learn about the history that took place so long ago.

Their first stop is the world-famous Parthenon, a temple dedicated to the Greek goddess Athena. The Parthenon is considered to be one of the most important buildings that remains of Classical Greece, and it is a symbol of the great art and power that it once held. Macros, Calcul, and Miss Weck were surprised to learn that the main destruction of the Parthenon didn't occur until 1687. It took 288 years after this, though, for the Greek government to begin reconstruction. Miss Weck then wants to know in what year reconstruction efforts began.

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Surprise!
Adventure #59

Macros and Calcul are terribly sad because they know that Miss Weck is flying back to the United States today and will no longer be able to join them on their wonderful adventures. They decide that they are not ready to leave her behind just yet, so they devise a creative plan. They know Miss Weck is flying back to Indianapolis, IN, and they decide to be there when she arrives.

Due to the large time difference, Macros and Calcul have to make a few calculations to make sure they will make it to the airport in time to surprise Miss Weck. They know that her flight arrives at 5:30 p.m. local time, and must calculate what time this is in Germany. If Germany is 6 hours ahead of Indiana, what time in Germany will Macros need to wave his magic wand to send them to Indianapolis?

Work Space:

Final Answer:

Explain how you solved this problem:

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Strategies used: _____

Date: _____ Name of Apprentice: _____

Problem of the Day:
Macros and Calcul and the Mysterious Disappearance
Adventure #60

Macros and Calcul make it to the Indianapolis Airport just in time! Miss Weck's flight has just arrived, and the pair waits anxiously for her to come through the arrival gate. They wait patiently as all the passengers stroll through, hugging loved ones and smiling with happiness to be home. Macros and Calcul wait and wait, but Miss Weck never walks through the gate. They begin to panic, and decide that they must take action immediately.

It is your time to shine and help Macros and Calcul find Miss Weck. You have been promoted to the status of *Master*, because you have shown your determination and perseverance as a *Problem Solving Apprentice*. Your task today is to create your own theories or clues as to where Miss Weck disappeared to and to attempt to solve this mystery. Good luck and keep using your knowledge to never stop solving problems!

Work Space:

Final Answer:

Where in the world do you think Miss Weck is?

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Strategies used: _____

Problem of the Day: Answer Key

1. Calcul

2. 2/6 **or**1/3

3. 10/13

4. $68

5. $6.60

6. 1 dime and 2 pennies, 2 nickels and 2 pennies, 1 nickel and 7 pennies, **or** 12 pennies

7. Yes

8. 38 feet

9. 18 units^2

10. 30 centimeters^2

11. 2 hours; 120 minutes

12. Lipstick Lucy

13. 4:00 p.m.

14. Isosceles triangle

15. Reflection

16. Yes

17. Rectangle

18. Diamond

19. 1,500,000 soldiers

20. Thing 2

21. 2 hours

22. Mode: 4, Median: 4

23. Median: 3, Mode: 3 and 4, Range: 2

24. 13 years

25. C

26. 6:00 p.m.

27. 260 feet

28. 4 feet

29. 246 years

30. Peacocks: 3, Leopards: 5, Kangaroos: 7

31. 48 branches

32. 1 yard

33. 100 gallons

34. 15 feet

35. Raven: cheeseburger, Ryan: chicken wings, Duriae: salad, Michael: pepperoni pizza, Chloe: yogurt

36. Gallons

37. No

38. 36 yards

39. 8 cups

40. 216 inches^2

41. 250 centimeters

42. Spider monkey: decimeters, Boa constrictor: meters, Poison dart frog: centimeters

43. 846 milliliters

44. 13,000 grams

45. B

46. Macros: 11:06 a.m., Calcul: 11:18 a.m.

47. 180 minutes

48. 9 centuries

49. 2:45 p.m.

50. Yes

51. 266 days

52. C

53. 14 hours and 15 minutes

54. Rotational symmetry

55. 35

56. 84 kilometers^2

57. 5,773 islands

58. 1975

59. 11:30 p.m.

60. Answers may vary

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Images

*All images found via *Google Image* search

Adventure 2:

http://www.wsaz.com/blogs/chrisbaileysblog/Happy_Groundhog_Day_Weather_138544254.html

Adventure 3: http://idahoptv.org/dialogue4kids/season7/volcanoes/links.cfm

Adventure 5: http://www.memphisriverboats.net/

Adventure 7: http://www.pvsurfshop.com/

http://www.decorate-your-room.info/tag/surfboard/

Adventure 8:

http://unlfoodadminjava.unl.edu:8080/nep/pages/lessons.jsp?what=informationModuleD&informationModuleId=b6d767d2f8ed5d21a44b0e5886680cb9

Adventure 9: http://dressed.ru/items/170606-I-love-Paris

Adventure 10: http://www.leehansen.com/clipart/Themes/Pirates/pages/treasure-chest.htm

Adventure 11: http://imagesbyheatherm.wordpress.com/2010/07/09/cowboy-hat-svg-file/

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Adventure 12: http://teacher.scholastic.com/maven/timefor/index.htm

Adventure 13: http://thumbs.dreamstime.com/thumblarge_310/1221029288mc4L62.jpg

Adventure 14 and 16: http://www.bermudastyles.com/bermuda/the-bermuda-triangle.php

Adventure 17: http://www2.lhric.org/pocantico/tubman/urmap.gif

Adventure 18: http://www.blog-city.info/en/img1/10452_evil%20wizard.gif

Adventure 19: http://www.pocanticohills.org/civilwar/graphs.htm

Adventure 20: http://www.fanpop.com/spots/dr-seuss/images/54084/title/cat-hat-photo

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Adventure 21: http://www.filtersfast.com/blog/wp-content/uploads/2011/12/cleaning14.jpg

Adventure 22: http://en.wikipedia.org/wiki/File:Vector_Oreo.svg

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Adventure 25: http://www.logoinn.net/zodiac-logos/libra-and-balancing-scales-symbolism-of-zodiac-signs

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Adventure 26: http://www.tourist-information-uk.com/buckingham-palace.htm

Adventure 27: http://en.wikipedia.org/wiki/Stonehenge

Adventure 28: http://www.abilenepipers.com/a_members.htm

Adventure 29: http://www.imageenvision.com/cliparts/lips

Adventure 30:

http://www.animalclipart.net/animal_clipart_images/hopping_kangaroo_silhouette_0515-1006-2405-3555.html

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Adventure 31: http://magic-mural-factory.com/Level_1/Articles/Tree%20Mural.htm

Adventure 32: http://farm5.staticflickr.com/4129/4962341952_7afd83c203_z.jpg

Adventure 33:

http://behance.vo.llnwd.net/profiles/54360/projects/47588/543601194549947.jpg

Adventure 34: http://www.britannica.com/EBchecked/media/112238/Monument-marking-the-Equator-on-the-outskirts-of-Quito-Ecua

Adventure 35: http://teacher.scholastic.com/maven/pdf/cafeteria_caper.pdf

Adventure 36: http://dsc.discovery.com/sharks/shark-pictures/whale-shark-pictures.html

Adventure 37:

http://www.animalactivism.org/documents/photos/med_23756_ridgeways-flyer.jpg

Adventure 38: http://www.therugs.com/images/UWOA/Novelties/041-06570.jpg

Adventure 39: http://www.bbc.co.uk/history/ancient/egyptians/images/gal_04_dyn.jpg

Adventure 40: http://www.english-online.at/history/sphinx/great-sphinx-of-giza.jpg

Adventure 41: http://www.squidoo.com/save-amazon-river-wildlife-and-conserve-rainforest-amazon-animals-plants

Adventure 42:

http://www.srl.caltech.edu/personnel/krubal/rainforest/Edit560s6/www/images/animals/animals.gif

Adventure 43:

http://images.weddingclipart.com/images/1/1243874329946_710/img_1243874329946_7101.jpg

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Adventure 44: http://www.toadbooks.com/book/9780618131037

Adventure 45: http://teacher.scholastic.com/maven/shapes/index.htm

Adventure 46: http://beautifulplacestovisit.com/wp-content/uploads/2011/12/Grand_Canyon_Arizona_09.jpg

Adventure 47: http://www.americanet.de/html/california_death_valley_natio.html

Adventure 48: http://www.americansouthwest.net/california/photographs700/three.jpg

Adventure 49: http://www.lrgiles.com/?attachment_id=1009

Adventure 50:

http://upload.wikimedia.org/wikipedia/commons/thumb/8/8a/Bai_yun_giant_panda.jpg/170px-Bai_yun_giant_panda.jpg

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Adventure 51: http://www.bostonbakesforbreastcancer.org/summer-sun-radiation-and-chemo/

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Adventure 52: http://www.clker.com/clipart-blank-shield-1.html

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Adventure 54: http://twistedone151.files.wordpress.com/2009/06/triskele.png?w=450

Adventure 55: http://www.littleflowerhighschool.org/?pid=241,

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Adventure 56:

http://static.travel.usnews.com/images/destinations/73/santorini_main_image_-_revamp_cropped_445x280.jpg

Adventure 57: http://www.greek-islands.us/greece-map.gif

Adventure 58: http://static.ddmcdn.com/gif/parthenon-and-the-acropolis-landmark-1.jpg

Adventure 60: http://4.bp.blogspot.com/-6uKkoOOmQDY/TXNCkxErJSI/AAAAAAAAAGs/DZ2_z0hyIwc/s1600/128613%252Cxcitefun-congrats9sv.gif

Modified Text

The following problems include text from a public source, which was used with permission and modified for the purpose of this problem solving series. Each original text is a story problem from *Math Maven's Mysteries*, a teacher resource from scholastic.com.

Scholastic. (n.d). Math Maven's mysteries. Retrieved from

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Adventure 12: Time for a Crime

Adventure 25: The Secret of Equation the Great

Adventure 30: Mystery at the Peculiar Zoo

Adventure 35: Cafeteria Caper

Adventure 45: The Case of the Shifting Shapes

Adventure 55: The Bell Clapper Caper